

Knowledge, Attitude and practice of Computer Vision Syndrome among medical students and its impact on ocular morbidity

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ABSTRACT

Background: Computer vision syndrome is a common global problem among millions of computer users including medical students. Medical students are preferring soft copies rather than textbooks. The aim of this study was to assess the knowledge, attitude, and practice of MBBS students about Computer vision syndrome, and to identify its ocular morbidity among them.

Methods: A descriptive cross-sectional survey based on the questionnaire was conducted among 1st- 4th year MBBS students of the Institute of Medicine and 80 students underwent detailed ocular evaluation.

Results: A complete survey response was received from 236 students out of 299 students (Response Rate 80%). The mean age of MBBS students was 21.38 years \pm 1.328 years and the range were 19-22 years; 76.2% were male and 23.8% were female. The majority (37.2%) spent 2-3 hours/day on the computer and had a higher risk (p-0.0001) of developing Computer vision syndrome. About 69.5% students used a computer at the level of the eye but there was a significant reduction in Computer vision syndrome (p-0.0001) among those who had computer screen below the eye level. Association between taking breaks (p-0.0001) and frequent blinking (p-0.0411) during computer use and relief of symptoms was significant. Only 22.9% had pre-existing knowledge of Computer vision syndrome and only 25.5% of them were practicing the ideal viewing distance.

Among 80 medical students randomly selected for detail eye examinations (63.7% male; 36.2% female), the prevalence of Computer vision syndrome was 71.6%. The commonest ocular complaint was a headache (50%) and dry eyes (45%). Myopia was the commonest refractive error (31.2%) and the orthoptic problem was prevalent among 17.5% students.

Conclusions: The survey showed that Computer vision syndrome is relevant among MBBS students but the knowledge, attitude, and practice of Computer vision syndrome among them is poor.

Keywords: Attitude; computer vision syndrome; eyestrain; headache; knowledge; practice; medical students.

INTRODUCTION

Computers are now an integral part of our day to day activities,¹ its use in medical education is rapidly developing. Ocular symptoms are common among computer users.^{2,3} It includes eye strain, foreign body sensation, redness, blurred vision and double vision. All these symptoms are roofed under "Computer Vision Syndrome"(CVS).^{4,5} It has affected 75-90% of computer users.⁶ Now, newer terminology is "Digital Eye Strain."

The printed books are being replaced by electronic copies even in medical field. Symptoms of CVS occur when the demand of the eye exceed the abilities of the

individual eye to perform the task.⁷

Ocular changes are reported in 92.1% of computer users in Nepal.³ But, there is no published report on the prevalence of CVS among the medical students in Nepal. Hence, the objective of this survey was to assess the knowledge, attitude, and practices (KAP) prevalent among the medical students towards CVS and its burden.

METHODS

A descriptive cross-sectional questionnaire study was conducted among 299 students, MBBS students of the Institute of Medicine (IOM). The main tool used for the

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study was 27 self-developed structured questionnaires with five sections of questions. All the MBBS students from 1st - 4th year present on the day of questionnaire survey day were included. The response rate was calculated among those who completely answered all 27 questions. The random sampling technique was used to identify 15 MBBS students from each year to undergo a detailed ocular evaluation which included uncorrected visual acuity, refractive error, Schirmer's test, intraocular pressure, and orthoptic evaluation. From the questionnaire response, 5 extra students from each year were again identified as having CVS problem and they were also included for their eye examination.

Entry of data entry and its analysis was done using SPSS version 21.0. Descriptive statistics using mean, standard deviation percentages, frequency tables, and figures were used in the data analysis and interpretation. The confidence interval was considered at the 95% level. A paired sample T-Test was used for evaluation and considered statistically significant if the value was less than 0.05. Ethics approval was received from the Institutional Review Board of the Institute of Medicine. Adherence to the tenets of Declaration of Helsinki maintained. Informed written consent was obtained from all respondents.

RESULTS

A total of 236 students out of 299 MBBS completed the survey with a response rate of 80%. The mean age of medical students participating in this survey was 21.38 years with SD 1.328 years. Among them, 180 students (76.2%) were male and rest 56 students (23.8%) were female.

On inquiring about their preference for the electronic gadget, most of them, preferred computer 75.8% either as a laptop(42.8%) or desktop(33%). The smartphone was the device of choice for 61% and few used both. The duration spent by the students on the computer is shown in Table 1.

Table 1. Average Hours spent on computer daily.

Hours/day	Number of students	Percentage
≤1 hour	21	8.8%
1-2 hours	52	22%
2-3 hours	88	37.2%
3-4 hours	39	16.5%
4-5 hours	23	9.7%
≥ 5 hours	16	6.7%
Total	236	100%

The MBBS students were asked about the level at which they placed their visual display terminals while using and

69.5% respondents had a habit of using the computer at the level of the eye, 25.5% below the level of eye and 12.5% above the eye level.

While using computers, 83.5% of the MBBS students preferred the use of fluorescent light or CFL and only 16.5% preferred natural light. The survey found that 54.7% of the students who initially thought to be free from any eye related problems were found to have symptoms related with CVS.

Mostly experienced ocular symptoms were blurred vision(n-63;26.7%), dryness(n-30;12.7%) and watery eyes(n-16;6.8%). Headache and eyestrain in 19(8%) students.

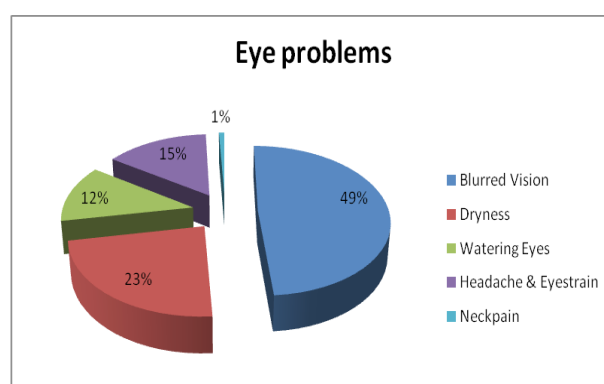


Figure 1. Pre-existing eye problems experienced by students when not at work.

Around 81(34.3%) medical students had consulted eye specialist with their problems. And 48(20.3%) students were already using glasses. The range of their refractive power between -0.50D to -4.25D. Five students (2.1%) were using contact lens for their refractive corrections and 11(4.6%) students were using some forms of eye drops. And 51.3% preferred to take a break from their work and 7.6% never bothered to do anything for their eye problems.

The term 'awareness' was used to mean having heard of CVS. Of the 236 medical students, only 22.9% of the respondent were aware about CVS and its effect but 77.1% respondents were not aware of CVS.

Knowledge of CVS was described as understanding the meaning of CVS. Among 236 respondents, 71% of them understood that CVS includes features combined of headache with eyestrain and blurred vision. (Table 2)

Table 2. Knowledge/understanding of CVS by the students.

Understanding of meaning of CVS	Frequency	Percentage
Tiredness during computer use	9	3.9%

Glasses required for clarity while using computer	4	1.7%
Combination of headache, eyestrain & blurred vision	169	71.6%
Only heard, do not know it exactly	54	22.8%
Total	236	100%

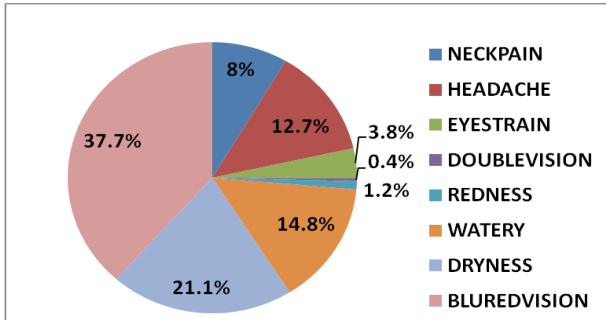


Figure 2. Distribution of Associated CVS problems

The commonest source from where the respondents had gathered their knowledge on CVS was via radio and television (87%).

Around 71.6% of the participants responded that they had atleast one of the symptoms associated with CVS (Figure 2).

On analyzing the data collected, we found that the students using the computer for more than 2 hours per day were likely to experience CVS significantly (P =0.001). (Table 3)

Variable	No. of students	CVS symptoms present	No symptoms	P value
Duration of computer use				
Up to 2 hours	73	23	50	0.0001
More than 2 hours	163	152	11	
Preventive measures				
Take a break	141	42	99	0.0001
Close eyes	61	26	35	0.2401
Blink more frequently	34	14	20	0.0411
Level of computer screen				
At or above eye level	176	151	25	0.0001

Below eye level	60	47	13	0.0001
Lighting in the room				
Fluorescent lighting	197	128	69	0.3175
Natural lighting	39	21	18	

Whenever they experienced computer related eye problems, 36.8% of students preferred to take break and move around, 25.8% closed their eyes for relief, 22.8% took a break and remain seated and 14.4% preferred to blink frequently. The students preferred to take a break among 51.2% followed by close eyes among 41.1% to feel relief from their ocular discomforts while using computer.

When asked about what they considered as preventive measure from CVS, 34.3% considered using glare screen and 28.3% considered regular eye checkup as best preventive options from CVS Computer screen level was found to be non-protective and CVS was present irrespective of where the participants kept it from eye label (Both groups p = 0.001)

In regards with the information gathered from the students studying at various levels of MBBS, we selected randomly selected 15 students from 1st to 4th MBBS year students. Additional 5 students who had ocular problems during computer use were identified based on the questionnaire survey. Hence a total of 80 medical students underwent a detailed ocular examination to assess the presence of CVS related ocular morbidity.

The mean age of students was 21.38 years ± 1.328 years and the range was 19-22 years; 51(63.7%) of them were male and 29(36.2%) of them were female. All of them were users of more than one digital device for 2-5 hours/day.

The Presenting visual acuity was normal in 78.7% of examined medical students. The vision was low in 1 student due to amblyopia(<6/18 with best refractive correction) The most common complaint identified during history taking was headache (50%), dry eyes (45%) and difficulty in focusing (5%). Around 28(35%) of the students complained of more than one symptom(s).

A detailed ocular evaluation including slit-lamp examination, refraction, Schirmer’s test and orthoptic evaluation was done among these 80 students. Myopia was the commonest refractive error among them (n-25; 31.2%). Among them, 23(92%) students were aware of it and previously wearing glasses and 2(8%) of them were unaware of their myopic status and were identified for the first time. Among previous glass wearers, 3 (12%) of

them were using spectacles which were not balanced with their refractive status and needed change.

Table 4. Ocular findings among evaluated students.

Ocular Findings	Frequency	Percentage
Myopia	25	31.2%
Dry Eyes	23	28.7%
Orthoptic Problems	14	17.5%
No abnormalities Detected	18	22.5%
Total	80	100%

Dry eyes were the second commonest ocular findings and were present in 23 (28.7%) students. The orthoptic problem of various types was identified in 14 (17.5%) student. The commonest type of orthoptic problem was a combination of fusional and convergence insufficiency (FI/CI) which accounted for 43% of all orthoptic problem). All of the participants with FI/CI complained of a headache. These conditions were previously undiagnosed or when questioned to the participants. They were all mandated treatment by the orthoptic department in form of Synaptophore therapy, prism therapy, and Brock-string exercise.

DISCUSSION

The incidence of CVS among computer users is reported to be between 64% and 90%.⁸⁻¹⁰ But there is limited published data regarding visual ergonomics among medical students.

This survey based assessment among medical students showed that only 22.9% had the pre-existing knowledge on CVS. With this in regards, among them only 25.5% of them were practicing the ideal viewing distance at the level below the eye. Our study identified the prevalence of CVS among Nepalese medical students to be 71.6%. However, its reported to be as high as-94.8% of the medical students of Pakistan and 89.9% of the university students of Malaysia.¹¹⁻¹³ A survey of optometrists showed that almost 14.5% of patients schedule the examination primarily because of problems related to work with computers.¹²

Nearly 80% of those spending more than two hours a day in computer suffer from the symptoms of CVS.⁹ Thereby, increase in the number of hours spent on the computer has a direct relation with increased risk of CVS. In our study, most of the students were using computer continuously for >2 hours and had a significant (p-0.0001) association with CVS. Mutti et al reported that people spending 6-9 hours daily at a computer have pronounced visual symptoms.¹³ Symptoms of CVS have even been reported among ophthalmologists having exposure to computers for more than 3.59 hours.¹⁴

Long hours on the computer screen without pause also cause visual problems like shifting focus on the screen, documents and keyboard. This is because, the video display terminal consists of thousands of tiny, bright spots (pixels) or horizontal lines (rasters) that collectively form unresolved images which lack sharp edges and blur together.¹⁵

Medical students are shifting towards soft copies and electronic books than conventional methods. This shift has been so rapid that the human eyes may have failed to cope up with the near working habit in a new visual environment for extensive hours and in stressful environments. It is quite alarming to note that a group of well-educated individuals belonging to medical fraternity itself have so subtle knowledge in CVS.

Level of the computer screen has a direct relation with CVS. People who use their computer screen at or above the eye level have reported asthenopia. But using the computer monitor to a viewing angle of 15° lower than the horizontal level has reported reducing the musculoskeletal discomfort (neck pain and back pain) and visual discomfort.¹⁶ However, our study showed that the level at which the screen is kept from eye level is not protective against CVS. Although known that an upward gaze exposes 40% more of the cornea causing the tear film to dry quicker, our study found that keeping the eye level at screen level produced no additional benefit (P=0.001).¹⁷ Reflections along with glare from video display terminal (VDT) displays are important source of eyestrain and headache, hence use of antiglare filters over VDT screens has been associated lower risk of CVS.¹⁸ And 34.3% of our students had the habit of using antiglare screens for ocular protection.

Taking regular small breaks may relax the accommodation process of the eyes, thereby preventing eye strain.¹⁹ And only 10.6% of our medical students had this knowledge as the most common preventive measure taken for relief of symptoms of CVS and there was a statistically significant association between taking breaks (p-0.0001) and frequent blinking (p-0.0411) during the use of computer and relief of CVS symptoms. Anshel et al had rightly suggested short in between work-breaks and following the rule of 20/ 20/20 i.e. after 20 minutes of computer use, one should look at something 20 feet away for 20 seconds can reduce the CVS risk.⁶

Although majority of our medical students were young male, there was no significant association between age, gender, ethnic, working experience and daily computer usage in our study which corresponds with the report from Hassan et al.¹¹ Thus, there was no significant association between socio-demographic factors and CVS

in our study.

However, it is very important to correct any visual problems by wearing spectacles or contact lenses to avoid eye strain.²⁰

It is a well known fact that the discomfort experienced during, and immediately after computer use and the presence of CVS dramatically lower quality of life and work productivity.⁸ Knowledge of preventive measures even if already present among individuals if not advocated into a good attitude and practice is not beneficial.

The main limitation of the study is that it is a single medical institute report. If a similar study is to be done in future, a multi-Centre study with ocular evaluation of all the students would add further identify the hidden burden of CVS and hence add more strength to the findings.

CONCLUSIONS

This descriptive hospital-based showed poor knowledge and attitude of CVS among the medical students' group along with poor practice and ignorance regarding CVS related ocular morbidity.

This might just be a tip of the iceberg of the underlying problem yet to be identified. We suggest that an awareness and health promotion regarding CVS is required to all the medical students due to their dependency on digital devices. They should be well counseled about the condition and encouraged to spread the knowledge of CVS to their colleagues or people of general population.

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